What is claimed is:

1. An apparatus for a tandem mass spectrometer, said apparatus comprising:

an ion source for generating ions from a sample;

first and second ion traps;

an analytical multipole positioned between and coaxial with said first and second ion traps; and

a mass analyzer;

wherein said analytical multipole is connected to a switchable power source, said switchable power source applying electric potentials to said analytical multipole and at predetermined times to generate electric fields thereon for trapping, transmitting or analyzing said ions; and

wherein said ions are introduced into said first ion trap from said ion source, said ions being trapped in said first ion trap for a first predetermined time, after which time said ions are transmitted into said analytical multipole to be mass selected for transmission into said second ion trap, said ions being trapped in said second ion trap for a second predetermined time, after which time said ions are transmitted into said mass analyzer.

2. An apparatus according to claim 1, wherein said ion source is positioned coaxially with said first ion trap.

3. An apparatus according to claim 1, wherein said ion source is positioned orthogonally

with said first ion trap.

4. An apparatus according to claim 1, wherein said apparatus further comprises at least one ion transfer device positioned between said ion source and said first ion trap.

5. An apparatus according to claim 1, wherein said apparatus further comprises a pre-multipole ion guide positioned between said ion source and said first ion trap.

6. An apparatus according to claim 1, wherein said apparatus further comprises at least one ion optic device positioned between said ion source and said first ion trap.

7. An apparatus according to claim 1, wherein said apparatus further comprises first, second, third and fourth pressure regions.

8. An apparatus according to claim 7, wherein said first pressure region is at a pressure of 1-2 mbar.

9. An apparatus according to claim 7, wherein said second pressure region is at a pressure of 1×10^{-2} mbar to 1×10^{-1} mbar.

10. An apparatus according to claim 7, wherein said third pressure region is at a pressure of 1×10^{-3} mbar to 1×10^{-2} mbar.

11. An apparatus according to claim 7, wherein said second pressure region contains an ion transfer device.

12. An apparatus according to claim 7, wherein said third pressure region contains said first ion trap.

13. An apparatus according to claim 7, wherein said fourth pressure region contains said second ion trap.

14. An apparatus according to claim 1, wherein said mass analyzer is selected from the group consisting of: time-of-flight mass spectrometer, quadrupole mass analyzer, FTICR, ion trap, magnetic, electrostatic, ion cyclotron resonance, quadrupole ion trap, and quadrupole time-of-flight.

15. A method for analyzing sample ions using a dual ion trap mass spectrometer, said method comprising the steps of:

generating ions from an ionization source;

introducing said ions into a first ion trap;

trapping said ions for a predetermined period of time within said first ion trap;

releasing said ions from said first ion trap such that said ions are transferred into an analytical multipole;

selecting ions of desired mass to charge ratio using said analytical multipole;

trapping said selected ions within a second ion trap;

fragmenting said selected ions in said second ion trap; and

releasing said fragmented ions from said second ion trap such that said fragmented ions are transferred into a mass analyzer for analysis.

16. A method according to claim 15, wherein said mass analyzer is selected from the group consisting of: time-of-flight mass spectrometer, quadrupole mass analyzer, FTICR, ion trap, magnetic, electrostatic, ion cyclotron resonance, quadrupole ion trap, and quadrupole time-of-flight.

17. A method according to claim 15, wherein said second ion trap comprises a collision cell.